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No. 45—1917.

British Engineering Standards Committee.

Formed in 1901 by

THE INSTITUTION OF CIVIL ENGINEERS.
THE INSTITUTION OF MECHANICAL ENGINEERS.
THE INSTITUTION OF NAVAL ARCHITECTS.
THE IRON AND STEEL INSTITUTE.
THE INSTITUTION OF ELECTRICAL ENGINEERS.

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REPORT

ON

BRITISH STANDARD DIMENSIONS

FOR

SPARKING PLUGS

FOR

INTERNAL COMBUSTION ENGINES.

(REVISED, SEPTEMBER, 1917.)

This Report supersedes Report No. 45, and the Interim Report (C.L. 2877) issued in December, 1915.

LONDON:
PUBLISHED FOR THE ASSOCIATION BY CROSBY LOCKWOOD & SON,
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September, 1917.

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Col. R. E. Crompton, C.B.; Capt. A. A. Ross (*Aeronautical Inspection Department*); Mr. L. A. Legros.

PREFACE TO FIRST EDITION.

A Conference was held by the Sectional Committee on Screw Threads and Limit Gauges on 24th October, 1907, to which representatives of the Automobile Industry and High Speed Engine Builders were invited. At the Conference attention was called by the representatives of the Royal Automobile Club and the Institution of Automobile Engineers to the desirability of standardising the thread on the sparking plugs of internal combustion engines, more especially for Automobile and Motor Launch Work, and the matter subsequently engaged the attention of the Committee. The Committee had hoped, in the earlier stages of their investigations, that the use of the Whitworth form of thread would have been practicable, but the result of their investigations revealed the fact that the general practice is to employ a thread similar to that originated by Messrs. de Dion-Bouton, of Puteaux, near Paris. Bearing in mind the evidence laid before them the Committee consider that considerable difficulties would be experienced by Manufacturers adopting any other Standard than the thread recommended in the present Report.

The Committee are indebted to Messrs. de Dion-Bouton for the kind assistance which they rendered and for the gauges and samples which they supplied. The specimens of actual work forwarded were submitted to the National Physical Laboratory for accurate measurement, and found to be in accordance with the dimensions given in this Report.

The Committee have deposited at the National Physical Laboratory a set of Standard gauges in order to enable manufacturers from time to time to check their gauges. By this means the Committee hope that satisfactory interchangeability will be secured.

The Report in its present form was adopted by the Sectional Committee on Screw Threads and Limit Gauges at their meeting held on 21st May, 1909.

This Report was approved by the Main Committee at their meeting held on 22nd July, 1909.

PREFACE TO REVISION OF AUGUST, 1917.

In December, 1912, the Committee's attention was called to the fact that, while many of the leading Automobile Manufacturers were working to a full diameter of 18·2 mm. for the size of the Sparking Plug Thread as recommended by the Committee in 1909, practically all the Sparking Plug Manufacturers were working to a diameter of approximately 18 mm. As an urgent communication

was received from the Royal Aircraft Factory for an authoritative pronouncement as to what the actual size of the Standard Thread should be, an Interim Report giving Revised Standard Full, Effective and Core Diameters for Sparking Plug Threads was drawn up and issued in December, 1915 (Publication C.L. 2877). The question of Standard Limits for securing the proper fit and interchangeability of the Sparking Plugs was next considered, and in view of the importance of the subject the further work in connection with Sparking Plugs was entrusted to a Sub-Committee specially constituted for the purpose, under the chairmanship of Col. Sir Capel Holden, K.C.B., R.A. It was felt desirable that tests should be carried out to ascertain the fit of the Revised Standard Sparking Plug Thread and of a number of Commercial Sparking Plugs in holes cut in existing automobile and aircraft engines. For this purpose a representative of the National Physical Laboratory visited the Royal Aircraft Factory, Farnborough, and the works of five of the leading Automobile Manufacturers, and the results of these tests were carefully tabulated. In the light of the information thus obtained, Standard Limits for the dimensions of the Thread on the Sparking Plug and in the Hole given in this Report have been put forward.

In revising the Report the opportunity has also been taken of standardising certain external dimensions of the Standard Sparking Plug for the convenience of engine designers and users, and including recommendations for a Standard Nomenclature of Sparking Plug parts.

It is proposed to complete the Report at an early date by including as well recommendations for Standard Gauges for checking the size of the Sparking Plug Thread and Hole.

The Report in its present form was adopted by the Sectional Committee on Automobile Parts at their meeting held on 20th July, 1917.

This Report was approved by the Main Committee at their meeting held on 26th July, 1917.

H. C. L. HOLDEN,

Chairman of the Sectional Committee on Automobile Parts.

REPORT
ON
BRITISH STANDARD DIMENSIONS
FOR
SPARKING PLUGS
FOR
INTERNAL COMBUSTION ENGINES.

[REVISED, SEPTEMBER, 1917.]

This Report supersedes Report No. 45, and the Interim Report (C.L. 2877) issued in December, 1915.

General.

1. All Sparking Plugs for Internal Combustion Engines which purport to be in accordance with the British Standard shall have threads of the form and dimensions given in Clauses 2 to 4, and shall conform with the External dimensions given in Clause 6.

The Committee make no recommendations as to the design of the Sparking Plugs except in so far as concerns the external dimensions given in Figure 3.

Form of Thread.

2. The form of Thread shall be in accordance with Figure 1. The angle of the thread is 60 degrees, and the crest is truncated to an extent equal to one-eighth of the total height (h) of the untruncated triangle. The root is filled in to a depth of one-sixteenth of the total depth (h) of the untruncated triangle, and is rounded as shown in Figure 1. The depth of the rounded portion shall not exceed one-sixteenth (h).

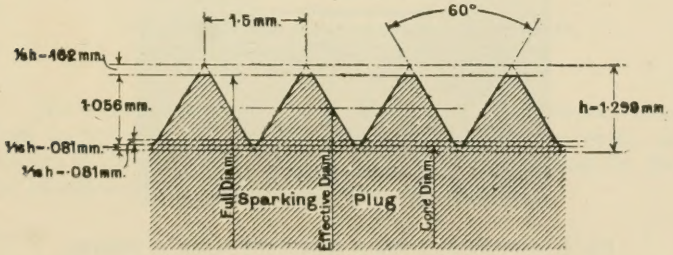

FIG. 1. FORM OF THREAD ON SPARKING PLUG.

Pitch of Thread.

3. The Pitch of the Threads shall be 1·5 mm.

Diameters of Thread.

4. The Full Diameter, Effective Diameter and Core Diameter of the thread on the Sparking Plug and in the tapped hole shall be in accordance with the dimensions given in the following table :—

1	2	3	4	5	6	7
	Full Diameter.		Effective Diameter.		Core Diameter.	
	Max.	Min.	Max.	Min.	Max.	Min.
	mm.	mm.	mm.	mm.	mm.	mm.
Sparking Plug ...	17·975	17·850	17·001	16·876	15·864	15·739
Thread in Tapped Hole	18·312	18·187	17·176	17·051	16·201	16·076

Note.—The Tolerances* permitted in the above Table are based on a length of six complete Threads and include the Allowances* for pitch error and error in thread form.

Clearances.

5. The Clearances * between the crests and roots of the threads on the Sparking Plug and in the tapped hole are shown in Fig. 2.

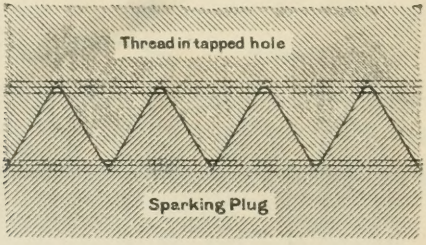

FIG. 2. CLEARANCES BETWEEN CRESTS AND ROOTS OF THREADS.

* See Appendix, page 12.

External Dimensions of Sparking Plugs.

6. The External Dimensions of the Sparking Plugs shall be in accordance with the dimensions given in Fig. 3.

The undercutting of the thread at the Shoulder of the Plug shall not be carried below the Core Diameter of the Thread.

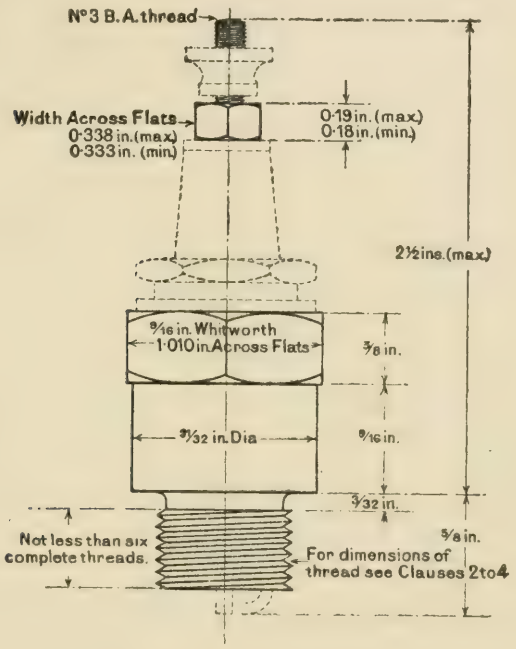

FIG. 3. EXTERNAL DIMENSIONS OF SPARKING PLUGS.

No recommendations are made as to the parts shown in dotted lines except that when Gland Nuts are used the width across corners of the Nuts should be less than the width across the flats of the Hexagon on the body of the Sparking Plug.

Nomenclature.

7. The Committee recommend the Standard Nomenclature for Sparking Plug Parts given in Fig. 4.

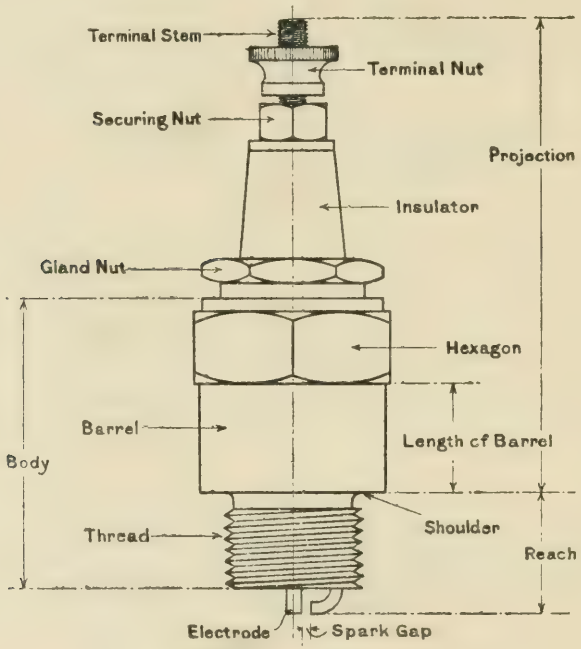

FIG. 4. STANDARD NOMENCLATURE FOR SPARKING PLUG PARTS.

APPENDIX.

DEFINITIONS

RELATING TO

SCREW THREADS.

APPENDIX.

DEFINITIONS RELATING TO SCREW THREADS.

The Definitions made use of by the Committee in their other Reports on Screw Threads and which are equally applicable to the threads of Sparking Plugs are for convenience repeated here.

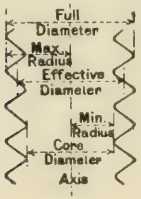

FIG. 5.

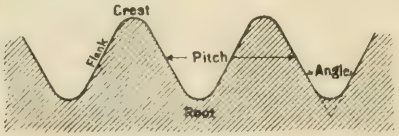

FIG. 6.

Tolerance.—A difference in dimensions prescribed in order to tolerate unavoidable imperfections of workmanship.

Allowance.—A difference in dimensions prescribed in order to allow of various qualities of fit.

Clearance.—A difference in dimensions, or in the shape of the surface, prescribed in order that two surfaces, or parts of surfaces, may be clear of one another.

Effective Diameter.—The Effective Diameter of a screw, having a single thread, is the length of a line drawn through the axis and at right angles to it, measured between the points where the line cuts the slopes of the thread. (Fig. 5.)

Core Diameter.—The Core Diameter is twice the minimum radius of a screw, measured at right angles to the axis. (Fig. 5.)

Note.—From Fig. 5 it will be seen that the "*core diameter*" of the male thread is measured between the roots of the thread; it should be borne in mind, however, that the "*core diameter*" of the female thread, being approximately the same dimension, is measured between the crests of the thread.

Full Diameter.—The Full Diameter is twice the maximum radius of a screw, measured at right angles to the axis. (Fig. 5.)

Crest.—The Crest is the prominent part of the thread, whether of the male screw or of the female screw. (Fig. 6.)

Root.—The Root is the bottom of the groove of the thread, whether of the male screw or of the female screw. (Fig. 6.)

Slope of Thread.—The Slope of the Thread is the straight part of the thread which connects the crest and root. (Fig. 6.)

Angle of Thread.—The Angle of the Thread is the angle between the slopes, measured in the axial plane. (Fig. 6.)

Pitch.—The Pitch is the distance in inches measured along a line parallel to the axis of the screw between the point where it cuts any thread of the screw and the point at which it next meets the corresponding part of the same thread. (Fig. 6.) The *reciprocal of the pitch* measures the number of turns per inch or millimetre as the case may be.

British Engineering Standards Association.

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